CLAIMS

1. A method of deposition of films of coating materials on a substrate, in particular for deposition of films of superconductive oxides and/or buffer layers of superconductive composite tapes, comprising a step of deposition of a film (2) on the substrate (4) associated to a step of gas treatment *in situ*, in which a flow (13) of gas is sent towards a working surface (14) of the substrate (4) or of the film (2) growing on the substrate, the method being characterized in that said gas-treatment step comprises a step of ultrasound expansion of the flow (13) of gas delivered.

2. The method according to Claim 1, characterized in that the deposition step is a vacuum deposition step.

3. The method according to Claim 1 or Claim 2, characterized in that the gas-treatment step is performed before, after, or during the deposition step.

4. The method according to any one of Claims 1 to 3, characterized in that the gas-treatment step is a step of oxygenation, the flow (13) of gas being a flow of oxygen.

5. The method according to any one of Claims 1 to 3, characterized in that the gas-treatment step is a reducing step performed with forming gas, for example an argon/hydrogen mixture.

6. The method according to any one of the preceding claims, characterized in that the step of ultrasound expansion is performed via at least one ultrasound-expansion nozzle (26), through which the flow (13) of gas is delivered, said nozzle being designed to generate a delivery area (40), in which at least as far as a distance of approximately 5 mm or approximately 10 mm from the nozzle there is an oxygen pressure approximately ten times the oxygen pressure outside

the delivery area.

7. The method according to the preceding claim, characterized in that said nozzle (26) has a ratio between the inlet cross section and the outlet cross section comprised between approximately 1:2 and approximately 1:20.

8. The method according to any one of the preceding claims, characterized in that the gas-treatment step is performed cyclically.

9. The method according to any one of the preceding claims, characterized in that the deposition step and the gas-treatment step are performed in a vacuum chamber (6), and the step of treatment comprises a step of pressurization of the flow (13) of gas prior to said step of ultrasound expansion.

10. The method according to the preceding claim, characterized in that, in the deposition step, the substrate (4) is carried through an evaporation area (16) formed within the chamber (6).

11. The method according to the preceding claim, characterized in that the substrate (4) is tape-shaped and is fed continuously through the evaporation area (16).

12. The method according to Claim 10 or Claim 11, characterized in that the substrate (4) traverses the evaporation area (16) along a substantially curved path and the evaporation area (16) is radially internal to said path.

13. An apparatus (1) for deposition of films of coating materials on a substrate, in particular for deposition of films of superconductive oxides and/or buffer layers of superconductive composite tapes, comprising a chamber (6), inside which are housed deposition means (10) for forming a

film (2) of coating material on a face (11) of the substrate (4) and gas-treatment means (12) for delivering a flow (13) of gas on a working surface (14) of the substrate or of the film growing on the substrate, the apparatus being characterized in that the gas-treatment means (12) comprise at least one ultrasound-expansion nozzle (26), through which said flow (13) of gas is delivered while undergoing ultrasound expansion.

14.The apparatus according to Claim 13, characterized in that said chamber (6) is a vacuum chamber.

15.The apparatus according to Claim 13 or Claim 14, characterized in that said nozzle (26) is designed to generate a delivery area (40), in which at least as far as a distance of approximately 5 mm from the nozzle there is an oxygen pressure approximately at least ten times the oxygen pressure in the chamber (6).

16.The apparatus according to Claim 15, characterized in that said nozzle (26) has a ratio between the inlet cross section and the outlet cross section comprised between approximately 1:2 and approximately 1:20.

17.The apparatus according to any one of Claims 13 to 16, characterized in that the deposition means (10) comprise evaporation means (15) for forming an evaporation area (16).

18.The apparatus according to Claim 17, characterized in that the gas-treatment means (12) comprise at least one diffuser (25) provided with a plurality of ultrasound-expansion nozzles (26), and moving means (27) for bringing said diffuser (25) cyclically within the evaporation area (16).

19.The apparatus according to Claim 17 or Claim 18, characterized in that it comprises pressurization means (28) for feeding gas under pressure to said gas-treatment means

(12).

20.The apparatus according to any one of Claims 17 to 19, characterized in that it comprises feed means (17) for carrying the substrate (4) through the evaporation area (16).

21.The apparatus according to Claim 20, characterized in that the substrate (4) is tape-shaped, and the feed means (17) are continuous-feed means for feeding the substrate through the evaporation area (16) continuously.

22.The apparatus according to Claim 20 or Claim 21, characterized in that the feed means (17) define a substantially curved path of the substrate (4) through the evaporation area (16), and the evaporation means (15) are set radially internal to said path.